SHANGHAITECH UNIVERSITY
School of Information Science and Technology
CS271: Computer Graphics II
Spring 2021
Programming Assignment 4
Released: Tuesday, April 20, 2021
Due: Friday, April 30, 2021

This assignment is meant to get you acquainted with basic mesh data structure programming, rendering a mesh, and basic UI programming. Note that subsequent assignments will build upon this assignment. You are given the source code of a simple mesh loader and viewer program written in C++ and GLUT. The provided program loads a mesh in the OBJ format, specified as the program argument. The loaded mesh is then stored using the half-edge data structure. In this assignment, you are required to get familiarized with the half-edge data structure and be able to manipulate the data structure. Specifically, you are required to implement the following functionalities:

✓ Display basic information of the mesh. After loading the mesh, display the numbers of vertices, half-edges (including boundary edges and their twin edges), faces, boundary loops, genus and connected components. You can find the number of connected components by simply using either a breadth-first-search or a depth-first-search graph traversal algorithm. To count the number of boundary loops, you need to "walk along" the boundary edges to form complete loops. To compute the number of genus, you can apply the extended Euler formula $\chi(M) = v - e + f = 2(c - g) - b$ where b is the number of boundary loops and c is the number of connected components.

The given sample source code can be compiled using Microsoft Visual Studio 2010 or higher edition. The project files are included. You can change the input filename in the property page of the project to load a different 3D model. Please refer to the supplemental material for more details.

Submission

Please submit your zipped file with a name "CS271_[Your full name]_[Your student ID]". You should submit both your source code as well as an executable file. Please also submit a report containing the following information: screenshots of program output, including the displayed mesh information (number of vertices, faces, boundary loops, etc.). If any special library is used, please state it in the report.